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MAINE PUBLIC DOCUMENTS

1952 - 1954

(in four volumes)

VOLUME II

# State of Maine

## 18th BIENNIAL REPORT

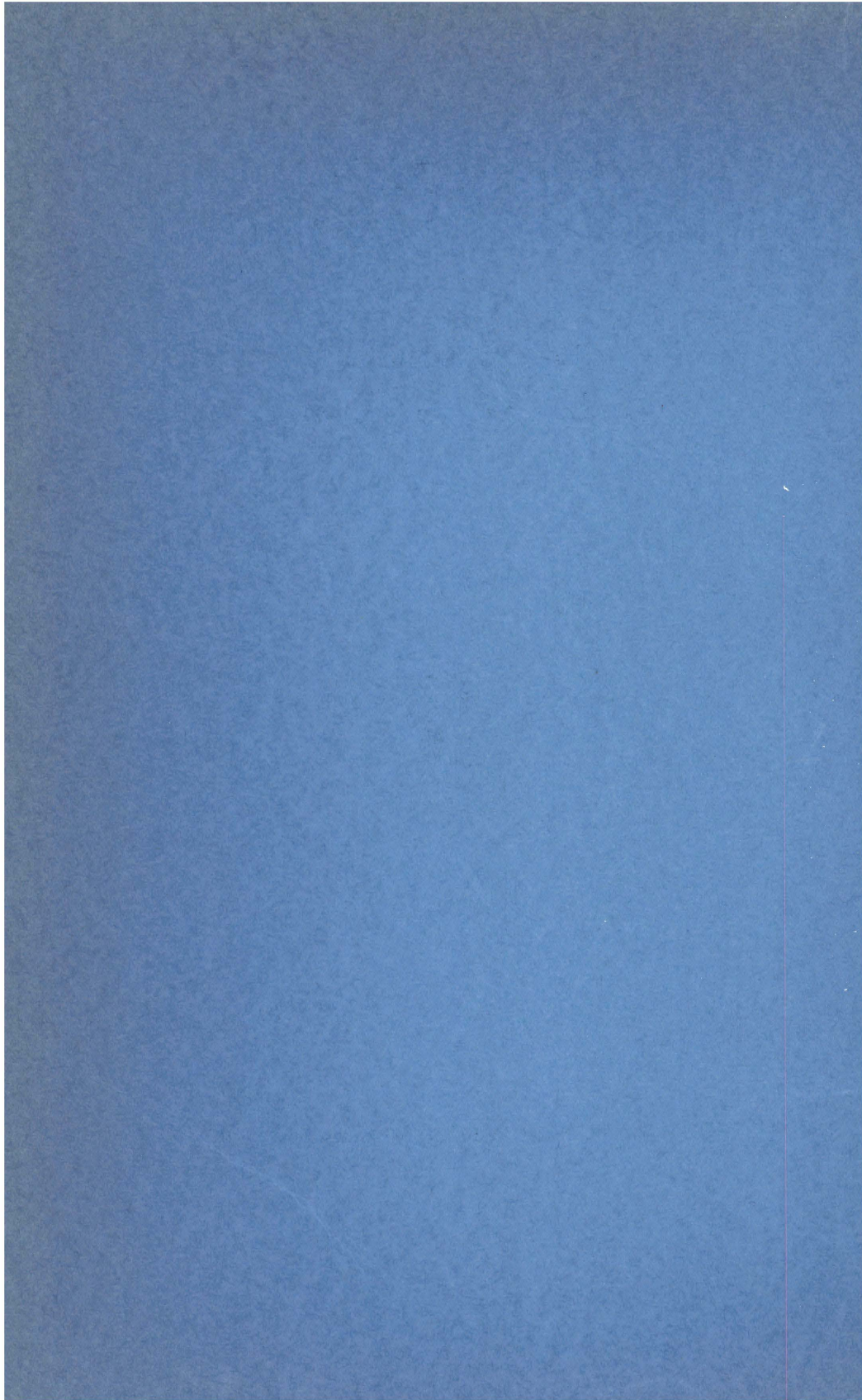
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### Department of Sea and Shore Fisheries



For Period  
July 1, 1952 to June 30, 1954

Augusta, Maine





**State of Maine**  
**18th BIENNIAL REPORT**

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**Department of**  
**Sea and Shore Fisheries**

For Period  
July 1, 1952 to June 30, 1954

Augusta, Maine

STATE OF MAINE

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BIENNIAL REPORT OF  
DEPARTMENT OF SEA AND SHORE FISHERIES

Augusta, Maine

*To the Honorable Governor and Executive Council:*

Sirs:

I herewith transmit, in compliance with the law, the report of the Department of Sea and Shore Fisheries, for the two years ending June 30, 1954, together with statistics and other pertinent data.

STANLEY R. TUPPER,  
*Commissioner*

## DEPARTMENT OF SEA AND SHORE FISHERIES

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## EXPENDITURES

	July 1, 1953 to June 30, 1954	July 1, 1952 to June 30, 1953
Administration . . . . .	\$ 27,072.28	\$ 23,586.59
Statistical . . . . .	5,476.83	5,016.16
Warden Service . . . . .	120,205.02	113,391.47
Aircraft . . . . .	426.96	—
Patrol Boats . . . . .	11,905.11	17,550.87
Propagation of Shellfish . . . . .	4,013.10	3,871.68
Operation of Research Station . . . . .	16,029.45	17,660.79
Research . . . . .	44,744.05	21,201.40
Survey of Closed Clam Areas . . . . .	535.08	8,825.60
Atlantic States Marine Fisheries Com- mission . . . . .	1,421.12	1,460.39
Restoration and Development of Shellfish Resources . . . . .	10,670.14	7,409.41
Total . . . . .	\$242,499.14	\$219,974.36



**DEPARTMENT OF SEA AND SHORE FISHERIES**  
**(Organization and Major Duties and Functions)**

*By* STANLEY R. TUPPER

It has been my privilege to serve as Commissioner of the Department of Sea and Shore Fisheries since June 18, 1953, replacing Robert L. Dow of Augusta, who resigned to devote his entire time to marine research. Since that time, I have traveled many hundreds of miles about the Maine Coast talking with fishermen and members of the industry and learning their problems firsthand. I feel that it is imperative that the Commissioner continually keep close touch with the men who make their living from the sea and the shore.

Much has been accomplished during this biennium; I will review a few highlights of this period.

ADMINISTRATION

An almost yearly threat to Maine fishermen are the hurricanes that strike our coast during the fall of the year. Annual loss of fishing gear and traps as a result of these serious storms is estimated at \$1,000,000. Most fishermen have been able to weather the financial loss involved; for those less fortunate, needing financial assistance to replace lost gear, the Department has been able to obtain Federal disaster relief loans speedily.

Noting the great need for lower insurance rates on lobster boats, I was able to persuade two marine insurance companies to cut their rates nearly in half.

In January of 1954, I represented the State in protesting a proposed Army firing range off Portland that we felt would work hardship on Maine lobstermen if taken for this purpose; happily, the Army decided against the move after a hearing on the matter.

Believing that there are two definite and logical ways of helping the domestic fishing industry, to wit: to limit the importation of foreign fish and shellfish and to turn back all import duties on fish into research and development for our own fishing fleets, I have, on a number of occasions, argued this position. We filed a brief with the United States Tariff Commission favoring restricting importation of fresh and frozen fillets.

In the spring of 1954, I attended a hearing before a Congressional committee in favor of the so-called Saltonstall Fisheries Research Bill

recently enacted into law which will provide \$3,000,000 for fishery research in the United States over the next year. This should be of great assistance to our Maine industry.

A branch office was opened at Boothbay Harbor where fishermen may obtain license applications and information on fishery problems without the necessity of going to Augusta. This entailed no extra expense to the State as the existing research station and State personnel were utilized.

### **Seed Lobster Program**

It is my belief that the program of purchasing and releasing egg bearing lobsters is one of the most important aids given the Maine lobster industry by the state.



**Nearly 6,000 Maine citizens are engaged in lobster fishing**

During the last two years, the Department has lacked sufficient funds to purchase the normal supply of seeders in Maine lobster pounds. The sum of \$4,500 per year appropriated during the last biennium was very inadequate and represented a substantial reduction from previous years. From 1927 to 1934, the Legislature raised \$17,000 per year for this purpose. The average appropriation in the past has been approximately \$15,000.

Because lobster dealers knew there was insufficient money to purchase all seed lobsters, they sold female lobsters immediately and stocked their pounds with males. Most of this seed stock comes from Canada and is extremely valuable to our propagation program.

To effectively carry on this seed lobster program, ideally a fund should be set up large enough to reassure Maine lobster dealers that all seed stock in their pounds would be purchased by the state.

## LAW ENFORCEMENT

Chief Warden Ronald W. Green has supervision over twenty-five wardens, including three Supervisors, three Investigators, and one Pilot. With a small force to patrol over 2,500 miles of coastline, a great deal of cooperation must be given by fishermen and members of the industry. The coastal warden is the Department's representative in the field and guardian of a \$75,000,000 industry upon which more than 60,000 persons are dependent for a livelihood.

Many changes have been made in the Law Enforcement Division. In July, 1953, a general wardens' meeting was held in Augusta. A program was outlined and instructions given pertaining to enforcement procedure. A meeting was held with the Civil Service Commission and recommendations and new rules were enacted in order to promote an efficient administration of the functions of the Coastal Warden Service.

Following these meetings and after careful study of each patrol and individual, many transfers were made among the personnel of the warden service in order to utilize each man's ability to the utmost.

It is interesting to note that in the fiscal period 1953-54, coastal wardens made nearly twice as many arrests as during 1951-52 and over 20 per cent more than in 1952-53. This reflects the very fine work of this service, shorthanded as it is. It is my opinion, however, that should the warden force be increased, making it possible to give the industry more attention, there would be less violations. The coastal warden service should operate as a preventive agency in enforcing conservation laws. After a violation has been committed, the principle of conservation has been defeated in many instances.

In 1941, the coastal warden service had 34 wardens. At that time, there were 5,441 licenses issued and revenue from licenses, fines and costs was \$17,000. In 1945, there were 43 coastal wardens with about as many licenses as in 1941. In 1947, members of the fishing industry asked the State Legislature to increase license fees **for the purpose**



**of law enforcement and research.** Legislation was enacted and, as a result, wardens' pay was increased but no new wardens were added.

In June, 1953, upon becoming Commissioner, the force was comprised of 24 men; I was able to employ another from existing funds, bringing the strength of the force to 25. In 1953, there were 11,500 licenses issued by the Department. Revenue from fines and costs amounted to \$62,000. **Thus we have the situation of having 18 less wardens than in 1945 while having over twice as many licensed fishermen.**

It is hoped that funds will be made available to increase the size of this force.

Our equipment was supplemented by a seaplane leased from the Inland Fisheries and Game Department and five portable two-way



**With acquisition of sea plane, coastal warden service takes to the air**

radios borrowed from Civil Defense. The seaplane is not only a valuable enforcement tool but is very important in fostering good public relations with island fishermen. In an emergency, it can be used for such purposes as to fly an island fisherman to the mainland for medical attention and to search for fishermen lost at sea. The coastal warden



service has no state-owned vehicles and each officer must provide his own transportation.

Through careful planning and additional work in repairing and maintaining our floating equipment, we were able to purchase three small outboard motor patrol boats. Through the extensive use of all floating equipment, the seaplane, and the limited amount of communication equipment, plus the excellent cooperation now received from other state departments, we have been able to spend more time among the fishermen and shellfish diggers and have been able to offer them greater services and protection.

## RESEARCH

The Research Division is under the supervision of Robert L. Dow, Director of Marine Research and Conservation, one of the acknowledged leaders in this field in the United States.

This Division has continued work on the herring investigation, and within the last year a report explaining the differences among the several diseases has been printed and made available to the industry. This booklet is meant to serve as a guide in distinguishing fungus disease from three other infections similar in appearance. It is especially valuable for inspectors.

Several small clam areas have been fenced to keep green crabs out. One of these has been in operation for two years and has proved to be very successful in protecting small clams. Two other small areas have been fenced in cooperation with the Fish and Wildlife Service research personnel. One fence to protect small quahog seed from green and rock crabs has been strung 300 feet across the mouth of a cove. All fences appear to keep crab damage considerably reduced.

Plans for the recirculated artificial sea water lobster display tank designed and developed by the Research Division have been requested from retail outlets throughout the east and the midwest. Several manufacturers have also indicated an interest in the possibility of commercial production.

An investigation of damage done to clams by digging has been completed by the Research Division. The Fish and Wildlife Service has also completed an investigation of how many clams are killed by burial and being turned over. From these two investigations it has been learned that in the average clam flat every time it is dug sixty out of each one hundred clams are killed.

In June, 1954, the Research Division completed the quahog suction dredge, VENUS M., and by the end of the season had dredged and transplanted 4,964 bushels of one-inch diameter seed quahogs in Casco

Bay. Plans for this type of work were begun in September, 1951, and after two years of experiments, a former Navy Rearming Boat hull was bought. This boat was rebuilt and outfitted with a Yeoman fish pump having a six-inch 20 foot long suction. Although the VENUS M. will be used mainly for transplanting seed quahogs from densely packed beds where growth is nearly impossible to good growing areas, it will also be used in other shellfish management and experimental work.

The Research Division has carried on lobster bait experiments and, in this connection, we have high hopes that the Fish and Wildlife Service will provide funds on a contract basis so that a great deal can be done this coming year. Other projects worked on include clam cleansing, research on scallops, salmon, smelts and marine worms. A comprehensive oil pollution study was made. Bacteriological surveys of polluted flats continue in order that flats may be opened to digging when examination shows it to be safe to do so.

### PROMOTION

The Promotional Division of this Department and its operation is vital in that the fishing industry must advertise if it is to compete for markets. This Division is continually bringing to the attention of the American public the superiority of Maine seafood products. Expenses of this Division are borne by the Maine Development Commission. Leroy M. McCluskey, a publicity representative for the Maine Development Commission, supervises this activity.

During the past year, a vigorous public relations and educational program has been instituted with emphasis on publicizing Maine seafoods in various and distant parts of the country. Thousands of pieces of literature have been sent out; comprehensive articles have been written and printed in leading newspapers and magazines; a weekly radio program was presented on three Maine stations; the aquarium at Boothbay Harbor has been enlarged and a marine museum added (during the summer months this aquarium-museum has over 4,000 visitors weekly from all parts of the country); television films of the industry have been made and shown on major television networks; lectures have been given and motion pictures have been shown; frequent appearances on radio and television programs have been made by key personnel; many inquiries from out-of-State individuals seeking sources of supplies have been answered and their inquiries have been referred to the proper branch of the industry. Seafood displays have been built and exhibited by Sea and Shore Fisheries personnel in various sections of the country such as Eastern States Exposition, Springfield, Massachusetts; Indiana State Restaurant Association

Convention, Indianapolis, Indiana; Mid-West Restaurant Association Convention, Cleveland, Ohio; Maine Sea Foods Festival at Rockland, and at National Lobster Week, LaMer Hotel, New York City.



**Crowning of the Maine Sea Goddess at the Seafoods Festival at Rockland**

It is gratifying to note that the people of Maine are becoming increasingly interested in the importance of our fisheries, their conservation and utilization. The development program as carried on by this Department is playing an important role in bringing nearer the day when there will be more Maine seafood produced and used throughout the nation, thereby resulting in increased incomes for the Maine coast fisherman.

The future plans of this Division are to enlarge on the foregoing activities and initiate new ones. Many and frequent changes are taking place in the production and marketing of Maine seafoods and this Department will continue to do everything possible to assist the industry to keep abreast of the times.

#### CONCLUSION

I want to express gratitude to Governor Burton M. Cross and the Executive Council for their confidence during a period which saw Department reorganization and many administrative changes.



I wish to acknowledge appreciation for the interest and unstinting support of the Sea and Shore Fisheries Advisory Council comprised of the following: Augustus Heanssler, Deer Isle; David Rutherford, Bath; Charles Olsen, Cape Elizabeth; Kenneth Gray, Edgecomb; and Arnold McConchie, Owl's Head.

Finally, I would like to voice an expression of sincere appreciation to the fishermen and members of the Maine fishing industry for the fine co-operation upon which success of our conservation program depends.



Brochures are mailed to all parts of this continent and abroad in answer to inquiries. These pamphlets, compiled jointly by the Maine Development Commission and the Department of Sea and Shore Fisheries, are written to be of special interest to the seafood dealer and consumer. They include:

- How to Prepare Maine Lobster**
- How to Eat Maine Lobster**
- The State of Maine's Best Seafood Recipes**
- How to Prepare a Maine Clambake**
- The Maine Lobster is a Promotional Asset**
- The Story of the Maine Lobster**
- Commercial Fisheries of Maine**
- Facts on the Nutritional and Economic Value of  
Maine Seafoods**
- Maine Coast Sport Fishing**



## LAW ENFORCEMENT

By RONALD W. GREEN, *Chief Warden*

As of September 30, 1954, the staff of this Division consisted of eighteen coastal wardens, three supervisors, three investigators, one pilot, one boat captain, an administrative clerk and a chief warden.

A breakdown of the expenses of operating the coastal warden service for the fiscal years 1952-53 and 1953-54 is given as follows:

### 1952-53

Reimbursed expenses, auto travel, etc. . . . .	\$ 27,198.49
Salaries . . . . .	81,812.09
Clothing . . . . .	2,467.92
Miscellaneous equipment and supplies . . . . .	1,816.97
Disability compensation . . . . .	96.00
	<hr/>
	\$113,391.47

### 1953-54

Reimbursed expenses, auto travel, etc. . . . .	\$ 27,310.20
Salaries . . . . .	89,620.50
Clothing . . . . .	1,882.35
Miscellaneous equipment and supplies . . . . .	1,372.47
Disability compensation . . . . .	19.50
	<hr/>
	\$120,205.02

Coastal wardens are selected under the provisions of the Civil Service regulations. The applicant must be physically fit, male, between the ages of twenty-two and thirty-two on date of examination, a citizen of the United States and a resident of the State of Maine domiciled in the state at least five years next preceding the date of filing application, at least 5 feet 6 inches in height, and have a high school education or its equivalent in training and experience.

Promotions within the service are made by the Commissioner as a result of an examination and with the approval of the Civil Service Commission. The coastal warden service was reorganized in 1954 in order to better serve the industry. The coast is now divided into three

sections with a supervisor in charge of each section, thus eliminating two supervisor positions. These supervisors were appointed as investigators. Investigators are assigned patrols within a section and are used extensively in other patrols throughout the state.



**Lobster measurements being taken by a member of the coastal warden service**

Changes in the fishing activity have made it necessary to transfer many men and rearrange many patrols in order to give a maximum of coverage. As a result of the reorganization, efficiency has increased; but we are able to give but a minimum of service to the industry with the present limited personnel.

### **Civil Defense**

In national or state emergencies, coastal wardens are placed at the disposal of the State Director of Civil Defense and Public Safety.

They are assigned to the police division and receive training along with the State Police and Inland Fisheries and Game officers.

## **Violations**

Violations have increased during the past two years.

The bulk of the arrests were made on illegal clams, illegal lobsters, and digging clams in polluted areas. A full breakdown may be found on another page of this report.

Cases of molesting fishing gear continue to be a problem and only with more equipment and more men will we be able to give fishermen in the industry the protection and service they require.

## **Equipment**

**A. Plane.** In the spring of 1954 we hired, from the Inland Fisheries and Game Department, a seaplane in order to supplement our equipment and in order to evaluate the necessity of such equipment. The use of this plane, which started as an experiment, developed into a necessity. The plane is a must in our present enforcement problems, and it is hoped that the incoming Legislature will make it possible for the Division to own the plane.

**B. Patrol Boats.** The Department has a combination patrol and research boat, three offshore patrol boats, one harbor and bay patrol boat, and three large outboard patrol craft.

The 28-foot cabin boat HEL-CAT is based at Jonesport in the summer and is used to cover the area from Calais to Schoodic Point. Based in Portland during the winter months, it is used in the Casco Bay area.

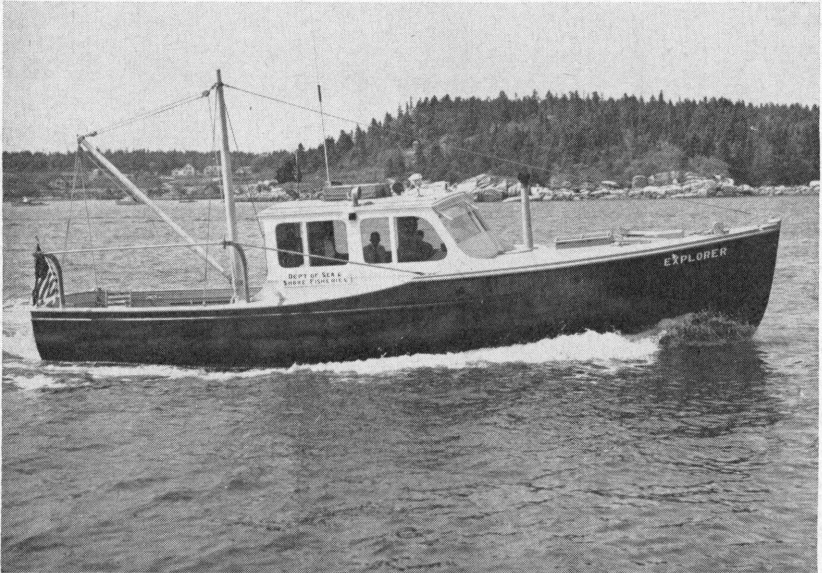
The 26-foot EXPLORER II, which was damaged by fire in 1952, has been completely rebuilt by warden personnel, repowered, and is based at Southwest Harbor, patrolling the area from Schoodic Point to Stonington.

The 34-foot GUARDIAN is based at Vinalhaven and is used to cover the area from Stonington to Monhegan.

The 26-foot MINX is based at Boothbay Harbor and is used in the area between Pemaquid and Cape Small Point.

Two of the 16-foot patrol boats with 25 h.p. outboard motors will be used to cover the area from Bailey Island to the New Hampshire line. Also available are four outboard boats and trailers. These are located at Harpswell, New Harbor, Friendship, and Stonington and will be used in places not covered by larger boats.

The 42-foot combination research-patrol boat EXPLORER is based at Boothbay Harbor, under Captain Thurlow Farmer, and is used jointly by wardens and research staff.



**Combination research-patrol boat EXPLORER**

**C. Radios.** The Director of Civil Defense loaned the Department five portable radios and has ordered four mobile units which will soon be available. At least six more units are required at this time in order to give us a minimum of radio communication.

**Prosecutions of Violations of Sea and Shore Fisheries Laws**

	July 1, 1952 to June 30, 1953	July 1, 1953 to June 30, 1954
Digging clams-quahogs without license . . . . .	25	43
Non-resident digging of clams-quahogs without municipal license . . . . .	24	44
Digging clams in Closed Areas . . . . .	24	69
Digging clams in Conservation Areas . . . . .	11	4
Digging marine worms without license . . . . .	5	—
Non-resident digging of marine worms without municipal license . . . . .	4	—



Lobstering without a license . . . . .	16	23
Illegal possession of lobsters . . . . .	109	120
Illegal possession of clams-quahogs . . . . .	89	94
Illegal possession of sea moss . . . . .	—	3
Illegal possession of smelts . . . . .	17	15
Selling clams without license . . . . .	24	17
Selling lobsters and lobster meat without license . . . . .	1	2
Illegal fishing for Atlantic Salmon . . . . .	5	—
Illegal use of otter trawl . . . . .	2	—
Failing to stand by . . . . .	10	10
Lobster traps not properly marked . . . . .	5	1
Illegal fishing . . . . .	2	—
Larceny of gear . . . . .	4	2
Selling African rock lobster . . . . .	1	—
Illegal transportation of clams . . . . .	2	8
Commercial fishing without license . . . . .	1	17
Molesting gear . . . . .	10	10
Larceny of scallops . . . . .	3	—
Selling mussels without license . . . . .	3	—
Serving lobsters and lobster meat without license . . . . .	1	—
Unlawful possession of lobster . . . . .	1	—
Intimidating a coastal warden . . . . .	2	—
Illegal transportation of lobsters . . . . .	2	2
Assaulting a coastal warden . . . . .	1	1
Selling lobster meat in improperly marked containers . . . . .	1	3
Illegal possession of eider ducks . . . . .	—	1
Resisting arrest . . . . .	—	1
Illegal taking of alewives . . . . .	—	1
Dredging clams . . . . .	—	1
Obtaining license through misstatement . . . . .	—	1
Taking herring by artificial light . . . . .	—	17
	—	—
	405	510

## DIVISION OF STATISTICS

By LOUIS R. CATES, *Statistician*

The Fishery industry and the governmental agencies concerned with the fisheries are particularly dependent upon statistical information for several reasons. The industry is widely scattered over miles of coastline and interior waters. A large portion of the catch is taken by small independent fishermen and much of it is sold through small dealers who have little contact with other segments of the fishery business. It is impossible for any person or agency to follow trends in the fisheries without adequate statistical data.

In order to supply the statistical data required in the conservation of this resource and to guide the industry in its business activities, the Department of Sea and Shore Fisheries has established a statistical section with a view to developing useful statistical coverage of the fisheries which is possible within the facilities available.

Fishery statistics are collected to serve two principal purposes — first, to provide conservation officials with information concerning the supply of fish and shellfish, and second to furnish members of the fishery industry, Government agencies and others with data which will aid in the orderly marketing of fishery products and research to improve the development of the industry.

The adoption of a plan for an adequate system for the collection of statistical information was established in 1939 and has put our State foremost among the Coastal States of the Union. The plan is continuing and improving under the supervision of Statistician Louis R. Cates.

As the official source of statistics for the State of Maine, the Statistical Section supplies many Government Agencies with data on fishery catch, gear and equipment, fishing effort and numerous other details together with serving the public with current details, trends and conditions.

In 1946 the combined efforts of our statistical section and that of the U. S. Fish and Wildlife Service under Mr. Arthur McKown greatly increased the efficiency of the section and produced a monthly report of the catch for the state in printed form. An annual summary of the landings was printed this same year together with a report of landings "by County" and "by Gear or Equipment." With the cooperation of the dealers and fishermen the information has continued to improve as the value of the information has been realized by all concerned.

Further efforts to improve the program were set up in 1952 with the addition of two Federal Agents of the Fish and Wildlife Service—Mr. Richard Mahoney at Portland and Mr. Churchill Smith at Rockland, Fishery Marketing Specialists. With the combined efforts of both agencies, the monthly report of Maine Landings has been compiled in more detail and minimum time and efficiency. Complete statistical information of catch each month is compiled and readily available to the Commissioner. The annual summary is being compiled on a three months' accumulative basis. This accumulative data is available to the department only, but is readily available for dissemination of information to the general public through the Commissioner's office in Augusta. Due to increased efficiency and experience the monthly report of landings is completed in a shorter period, and soon after the end of the year the Annual Summary of Maine Landings and catch by gear for each county will be ready for publication, far ahead of previous years.

With the addition of two Fishery Marketing Specialists, there has been established a Market News section in Portland and Rockland conducting a daily service with the Boston Market News Service, listing landings of the ports by vessel and species. The Department of Sea and Shore Fisheries, together with the Fish and Wildlife Service, is endeavoring to give the general public a closer look at the fishing industry as a whole in conjunction with Maine Landings.

Field operations are carried out from our Statistical Office located on the third floor of the Post-Office Building, Rockland, Maine. The general public and all persons interested in the fishing industry are welcome, and we will be glad to assist with any problems pertaining to our department. All information relative to statistics is compiled at this location. The personnel of both the Sea and Shore Fisheries and the Fish and Wildlife Service, work in close cooperation to gather the information. A schedule has been organized to sectionalize districts of the coast between the agents, so that all parts of the coast are regularly visited by the agents to gather all vital statistics and information. This data is combined to produce the final reports and statistics necessary. Sectionalizing the coastal areas to be covered provides more frequent visits to the areas and a more thorough coverage.

Numerous phone calls and personal visits are received at the Rockland office for information regarding statistics, licenses, regulations, fishery laws and all phases of the fishing industry. The agents in the Rockland office have distributed a large quantity of information for educational purposes by pamphlets available through the department.

We readily appreciate the use of the above office quarters, but it is hoped that future plans will permit the location of this office at a more convenient place more readily available to the general public. Rockland seems to be an ideal location for this activity, being approximately in the center of the Maine fishing industry. A more convenient and up-to-date equipped office with possible additional personnel to assist the public would tend to improve this department program.

Comparative landings for the State of Maine show an increase of redfish for the nine months' period of 1954—13,858,000 pounds with a value of \$615,000 over the previous period of 1953. This was due primarily to the transfer from other ports of nine large trawlers of the General Seafoods Corporation to the port of Rockland. An increase in these activities shows a further interest in fishing facilities of Maine ports.

Comparative landings of herring for the same nine months' period of 1954 over the previous year shows an increase of 39,800,000 pounds valued at \$42,700.

During August, 1954, the total lobster catch for the State was 5,257,500 pounds valued at \$1,710,200. This catch was established as the highest monthly catch on record.

With these particular items, it shows the importance of statistics to the industry and the prospects of ever increasing efforts and work necessary to compile them.

The department greatly appreciates the cooperation of the dealers, fishermen and all agencies assisting our statistical program, for without their continued support our work could not be accomplished.

It is hoped our statistical program will continue and the ultimate results will be further improvement to the utmost efficiency and to produce such information as is necessary to the conservation of our fishery resources and sound business management.



## STATION ACTIVITIES

By LEROY M. McCLUSKEY

The activities of the Sea and Shore Fisheries Station at Boothbay Harbor cover an increasingly wide and diversified field in promotional work. Broadly, they are four-fold:

To help keep the public informed, on behalf of the resource, of the many functions of the Department.

To help create a better understanding of, and support for, Maine fisheries in the minds of the public.

To help develop more and better markets for our fisheries products.

To help bring to the attention of the general public the importance of the fisheries to our national and economic life.

The aquarium at Boothbay Harbor is one of the outstanding exhibits of its kind in the United States. There, many species of Maine saltwater fish and shellfish are displayed in their natural habitat in illuminated picturesque tanks. New and larger tanks have been added to hold such species as shark and sturgeon. Tanks containing lobsters at various stages of growth have been re-located and improved.

A marine museum section has been added. Many items of interest, peculiar to the maritime regions, have been assembled. On display are various items of navigational equipment such as compasses, depth recorders, and marine sounding devices. Oddities of the sea such as walrus tusks and skulls, narwhale tusks, whale teeth, sea turtle skulls, vari-colored mounted lobsters, and many more attract the interest of the visitor, particularly those from the inland states and foreign countries. The many individual displays have been solicited and collected by the Station personnel at no expense to the State. Attractive show cases add to this unusual exhibit.

Native seals are on display in holding tanks at the dock, and seals captured by Station personnel have been sent to the Jackson Memorial Laboratories at Bar Harbor for cancer research and other experimental centers.

A broad stairway leading to the second floor has been built for the public's convenience. The second floor has been revamped to include the administrative office as well as a modern testing kitchen and tele-

vision studio which is open to the public. The biological office and staff has been moved to the first floor where all research offices and laboratories are now grouped together for greater efficiency.

The testing kitchen has been used in making motion picture film for television and other distribution. Films depicting the proper way to prepare and serve Maine seafoods have been produced and sent to various sections of the country. In conjunction with the Research Division and seafood processors, it is planned to use the testing kitchen to explore the food possibilities of some of our little-used products of the sea such as skates, sea urchins, mussels, and many others. Due to tremendous foreign and domestic competition, one of the major objectives of the Maine Fishing Industry should be to acquaint the consumer with new species which are in good quantity and distinctive in flavor and food value.

Numerous outside agencies have filmed the various activities of the station, including news cameramen, airlines publicity agents and magazine and newspaper photographers.

The building and assembling of various seafood promotional displays has been done by the Station personnel. These displays, shown at various expositions and exhibits throughout the country, are carefully planned and designed to bring to the attention of the distant consumer the excellence of our Maine seafood products.

Much progress has been made in providing information of interest to the general public and the fisherman. The Department recognizes the importance of both radio and television in the educational and publicity fields and has, by these media, stressed the nutritional value of Maine seafoods. Diversified programs broadcasted included interviews with officials of the U. S. Fish and Wildlife Service, the United States Coast and Geodetic Survey, the ministers and crew of the missionary ship, SUNBEAM. Radio forums have been held on various research projects, conservation, and pollution problems and pertinent programs were specifically beamed at times of special events such as Boy Scouts Conservation Week, the Rockland Seafoods Festival, Boothbay Lobster Time, and many others.

## RESEARCH PERSONNEL

### Full-time research personnel

### Investigations

Robert L. Dow, R.F.D. 1, Augusta . . . . .	Research Director
Dana E. Wallace, 37 Water Street, Hallowell . . . . .	Shellfish
Frederick T. Baird, Edgecomb . . . . .	Anadromous fish
Donald M. Harriman, Newagen . . . . .	Shellfish, lobsters
Phillip L. Goggins, Boothbay Harbor . . . . .	Bacteriology, lobsters
John W. Hurst, Boothbay Harbor . . . . .	Bacteriology, oil pollution
Louis N. Taxiarchis, Boothbay Harbor . . . . .	Marine worms, shellfish
Malcolm E. Richards, Steuben . . . . .	Shellfish
Richard C. Gray, Boothbay Harbor . . . . .	Heavy equipment operator

### Seasonal, part-time or temporary research personnel

Dr. J. Kenneth Donahue, Utica College of Syracuse University, New York . . . . .	Lobsters
Dr. Alton H. Gustafson, Bowdoin College, Brunswick . . . . .	Quahogs
Dr. Carl J. Sindermann, Brandeis University, Waltham, Massachusetts . . . . .	Herring
John S. Getchell, Maine Agricultural Experiment Station, Orono . . . . .	Lobsters
Dr. James M. Moulton, Bowdoin College, Brunswick .	Quahogs
Dr. Alfred B. Chaet, University of Maine, Orono . . .	Clams
Anthony Ganaros, Rutgers University, New Brunswick, New Jersey . . . . .	Clams
Walter Foster, Colby College, Waterville . . . . .	Sea moss

### Consultants on hydro-geological problems

Dr. Joseph M. Trefethen, University of Maine, Orono . . . . .	State Geologist
Dr. Wilmot H. Bradley, U. S. Dept. of the Interior, Geological Survey, Washington, D. C. . . . .	Chief Geologist

## RESEARCH DIVISION

By ROBERT L. DOW, *Director*

In the 16th Biennial Report of this Department I outlined briefly some of the research problems being investigated by personnel of the research division. In this 18th Biennial Report I would like to summarize again the work we have done in this field; what we are concentrating on currently, and what we propose for the future.

During our eight and one-half years of a continuous research program we have completed a large number of investigations, most of which have been reported in published form. Listed below are the reports which have been completed and published since the 17th Biennial Report:

### Fisheries Circulars

- #9—PROBABLE EFFECTS OF A SIZE CHANGE UPON THE LOBSTER INDUSTRY, Frederick T. Baird, Jr., January 1953, S&SF
- #10—AN EXPERIMENTAL PROGRAM IN SHELLFISH MANAGEMENT, Robert L. Dow, March 1953, S&SF
- #11—TOXICITIES OF SOME METALS ON LOBSTERS, (*Homarus americanus*), IN NATURAL AND ARTIFICIAL SEA WATERS, Donald M. Harriman, January 1953, S&SF
- #12—SOME OBSERVATIONS ON THE DISPERSION OF THE MARINE WORMS, (*Nereis* and *Glycera*), Dr. A. H. Gustafson, Ph. D., June 1953, S&SF
- #13—THE STATUS OF THE ALEWIVE FISHERY IN MAINE, Frederick T. Baird, Jr., August 1953, S&SF
- #14—MIGRATION OF THE DEEP SEA SCALLOP (*Pecten magellanicus*), Frederick T. Baird, Jr., January 1954, S&SF
- #15—SEED QUAHOG DREDGE, *VENUS M.*, THE, Robert L. Dow, Dana E. Wallace, August 1954, S&SF

### Research Bulletins

- #9—PRELIMINARY INVESTIGATIONS IN MARKING MARINE WORMS, Dr. A. H. Gustafson, Ph. D., April 1953, S&SF



- # 10—AN EXPERIMENT IN THE REARING TO MATURITY OF SILVER SALMON, Frederick T. Baird, Jr., May 1953, S&SF
- # 11—STUDY OF THE EFFECT OF RECIRCULATED NATURAL AND ARTIFICIAL SEA WATER ON THE MORTALITY OF LOBSTERS, A, John S. Getchell, June 1953, S&SF
- # 12—A DERMATITIS PRODUCING SCHISTOSOME WHICH CAUSES "CLAM DIGGERS" ITCH ALONG THE CENTRAL MAINE COAST, Carl J. Sindermann and Richard F. Gibbs, November 1953, S&SF
- # 13—STUDIES ON ECDYSIS IN THE AMERICAN LOBSTER, (*Homarus americanus*), J. Kenneth Donahue, Ph. D.  
2. Serum calcium levels under various normal conditions. September 1953, S&SF
- # 14—OBSERVATIONS ON THE EARLY LIFE HISTORY OF THE GIANT SCALLOP, (*Pecten magellanicus*), Frederick T. Baird, Jr., August 1953, S&SF
- # 15—CLAM (*Mya arenaria*) BREAKAGE IN MAINE, Robert L. Dow, Dana E. Wallace and Louis N. Taxiarchis, January 1954, S&SF
- # 16—MEAT YIELD OF MAINE SCALLOPS (*Pecten magellanicus*), Frederick T. Baird, Jr., February 1954, S&SF
- # 17—THE DISTRIBUTION OF VENUS LARVAE IN ORR'S COVE PLANKTON OVER THE TIDE CYCLE AND DURING THE SUMMER AND EARLY FALL OF 1953, James M. Moulton, Gareth Coffin, February 1954, S&SF and National Shellfisheries Association convention address for 1954
- # 18—DISEASES OF FISHES OF THE WESTERN NORTH ATLANTIC  
I. DISEASES OF THE SEA HERRING (*Clupea harengus*), Carl Sindermann, February 1954, S&SF
- # 19—DISEASES OF FISHES OF THE WESTERN NORTH ATLANTIC  
II. ICHTHYOSPORIDIUM DISEASE OF THE SEA HERRING (*Clupea harengus*), Carl Sindermann and Leslie W. Scattergood, June 1954, S&SF

# 20—STUDIES ON ECDYSIS IN THE AMERICAN LOBSTER, (*Homarus americanus*), J. Kenneth Donahue, Ph. D.

3. A Method for Differentiating Stages of the Intermoult Cycle. August 1954, S&SF and the American Philosophical Society *Yearbook*

### Technical Bulletins

# 3—METHODS TO REDUCE BORER DAMAGE TO LOBSTER TRAPS, Robert L. Dow, Frederick T. Baird, Jr., May 1953, S&SF

### General Bulletins

# 1—HERRING GULL-CORMORANT CONTROL PROGRAM, THE, STATE OF MAINE, Robert L. Dow, August 1953, S&SF

# 2—SURVEY OF THE LITTORAL ZONE OF YORK COUNTY, MAINE, WITH RESPECT TO COMMERCIAL PRODUCTIVITY, Louis N. Taxiarchis, July 1953, S&SF

# 3—SEA MOSS, (*Chondrus crispus*), SURVEY, WASHINGTON COUNTY, Walter S. Foster, November 1953, S&SF

### Miscellaneous

COMMERCIAL WORM DIGGING, Anthony Ganaros, September 1951, S&SF

### Special Reports

PRELIMINARY REPORT ON THE POSSIBILITY OF USE OF HYDROCARBON DIGESTORS AS AN INDEX OF OIL POLLUTION, John W. Hurst, Jr., Society of American Bacteriologists, 1954

PRELIMINARY EXPERIMENTS IN THE USE OF GROUND CONTROLLED AERIAL PHOTOGRAPHY IN INTER-TIDAL HYDROGRAPHIC SURVEYS, Robert L. Dow, National Shellfisheries Association convention address for 1954

USE OF EQUIPMENT AND TECHNIQUES IN APPLIED SHELLFISH MANAGEMENT, Dana E. Wallace, National Shellfisheries Association convention address for 1954

GROWTH STUDIES IN *VENUS MERCENARIA*, Dr. A. H. Gustafson, National Shellfisheries Association convention address for 1954

THE FUNCTIONAL ANATOMY OF THE ANTERIOR REGION OF THE MANTLE OF *MYA ARENARIA* LINNE, Louis N. Taxiarchis, Rutgers University thesis

A recapitulation of the present status of the department's fisheries research program appears below. For purposes of convenience it is broken down by species.

### **Lobsters**

- I. Basic continuing investigations:
  1. landings.
  2. stratified sampling of commercial catch.
  3. moulting.
  4. "red-tail."
- II. Investigations which have been completed or terminated:
  1. treatment of wood traps to reduce damage and commercial loss from marine wood borers.
  2. tagging lobsters in selected areas.
  3. growth and survival of sub-legal sizes.
  4. evaluation of non-traditional holding devices.
  5. shell disease.
  6. rearing methods.
  7. efficiency evaluation of various handling and packing methods being used in the industry.
- III. Investigations which have been partially completed but have been suspended for financial reasons:
  1. seasonal fluctuations in meat yield and meat yield of various size groups.
  2. problems of survival in pounds and other holding devices.
  3. management studies in various areas.
  4. lobster bait.
- IV. Investigations which are planned when and if personnel and money become available:
  1. an expanded lobster bait study.
  2. selective fishing of sub-legal sizes in order to predict future abundance.
  3. all problems listed under III above.

- V. Other investigations which should be carried on:
1. hydrographic problems in the distribution of larval lobsters.
  2. maturity of lobsters.
  3. methods of determining age.
  4. natural mortalities (except disease) other than those attributable to oxygen deficiency, temperature, and salinity, or combinations of these.
  5. viability and natural survival.
  6. an investigation designed to evaluate various management restrictions.

### Clams

- I. Basic continuing investigations:
1. landings.
  2. populations.
  3. bacterial surveys.
  4. predator control.
  5. effect of various types of pollution.
  6. flat improvement or modification.
  7. geological-biological investigations.
- II. Investigations which have been completed or terminated:
1. survey methods.
  2. effect of size restrictions.
  3. effect of DDT.
  4. breakage and digging efficiency.
  5. marine farming without predator control.
  6. geographical variations in meat yield.
  7. self-cleansing of clams from polluted areas.
- III. Investigations which should be continued when and if personnel and money become available:
1. an applied management program.
  2. the establishment of sanitary requirements.
  3. the effects of insecticides and other control measures upon predators.
  4. effect of harvesting on growth rates in the residual population.
  5. hydraulic harvesting.
  6. "water bellying."
- IV. Other investigations which should be carried on:
1. fertilization experiments.
  2. factors contributing to differences in growth within the same area.



3. factors other than predation which cause the failure of larval and juvenile clam survival.

### **Quahogs**

- I. Basic continuing investigations:
  1. landings.
  2. growth studies.
  3. populations.
  4. extension of range.
- II. Investigations which have been completed or terminated:
  1. culturing and rearing.
  2. transplanting methods.
  3. survey methods.
- III. Activities which are partially completed but have been suspended for financial reasons:
  1. salvage of stocks from overcrowded seed areas.
  2. larval distribution and survival studies.
  3. predator control.
- IV. Investigations which are planned when and if personnel and money become available:
  1. applied management.
- V. Other investigations which should be carried on:
  1. factors contributing to larval and juvenile survival.

### **Mussels**

- I. Basic continuing investigations:
  1. experiments to determine possible commercial use.
  2. methods of reducing mussels as competitors.

### **Scallops**

- I. Basic continuing investigations:
  1. landings.
- II. Investigations which have been completed or terminated:
  1. migration.
  2. meat yield.
  3. certain aspects of early life history.
  4. spawning.

- III. Investigations which are planned when and if personnel and money become available:
  - 1. further studies of early life history.
  - 2. survival.
  - 3. reconnaissance.
- IV. Other investigations which should be carried on:
  - 1. annual sampling of population in order to predict future stocks.
  - 2. natural mortality and predator mortality.
  - 3. predator control.

### Oysters

- I. Basic continuing investigations:
  - 1. experiments in growth, survival and reproduction of *Ostrea edulis*, the European oyster.
- II. Investigations which have been completed or terminated:
  - 1. experiments in growth and survival of *Ostrea gigas*, the Japanese oyster.
  - 2. the distribution of *Ostrea virginica*, the Eastern oyster in Maine waters.
- III. Investigations which are planned when and if personnel and money become available:
  - 1. commercial scale efforts to establish *Ostrea edulis*, the European oyster, in some Maine waters.

### Shrimp

- I. Investigations which have been partially completed, but have been suspended for financial reasons:
  - 1. reconnaissance.

### Smelts

- I. Basic continuing investigations:
  - 1. landings.
  - 2. populations.
  - 3. age, growth and survival.
  - 4. reproduction and survival.
  - 5. feeding habits.
  - 6. stream surveys.

- II. Investigations which have been completed or terminated:
  - 1. effect of catch restrictions.
  - 2. evaluation of times, places and methods now in force for taking smelts commercially or for sport.
- III. Investigations which are planned when and if personnel and money become available:
  - 1. investigation of factors influencing fluctuations in abundance.
  - 2. expanded stream survey program.
  - 3. physical improvement of spawning areas.
  - 4. demonstration management areas.

### **Herring**

- I. Investigations which have been completed or terminated:
  - 1. diseases of herring.
  - 2. fungus disease of herring.
- II. This program was terminated November 1, 1954. Further investigations will be carried on by the U. S. Fish and Wildlife Service.

### **Alewives**

- I. Basic continuing investigations:
  - 1. landings.
  - 2. stream surveys.
  - 3. stream improvement.
  - 4. stocking of suitable streams with spawn fish.

### **Marine Worms**

- I. Basic continuing investigations:
  - 1. landings.
  - 2. life history studies.
  - 3. reproduction, growth and survival.
  - 4. migration.
  - 5. management studies.

### **Haddock**

- I. Basic continuing investigations:
  - 1. landings.
- II. Investigations which should be continued if and when personnel and money become available:
  - 1. mesh-size regulations.
  - 2. migration and wanderings.
  - 3. reproduction, growth and survival in various areas.

## **Whiting**

- I. Investigations which should be carried on if and when personnel and money become available:
  1. evaluation of management restrictions.
  2. reproduction, growth and survival.
  3. migration.

## **Sea Moss**

- I. Basic continuing investigations:
  1. inventory of resource.
  2. classification of areas according to quantity, growth and production.

## **Rockweeds**

- I. Basic continuing investigations:
  1. investigation of commercial uses.

It should be pointed out that very little of our research program is being carried on in the station at Boothbay Harbor. Only necessary laboratory research is conducted there. The bulk of our work is carried on in the areas being studied where the problems actually exist. During the period that the herring investigation was carried on by the department, facilities of the Fish and Wildlife Service were utilized. Bacterial samples are processed at the Department's station because of the equipment and space required. The same condition holds true for some of the work done on lobsters, marine worms and lobster bait.



## SHELLFISH RESEARCH

By DANA E. WALLACE

### Soft-shell Clam Management Investigations

During the 1946-52 period our division carried out many transplanting experiments, using small soft-shell clams (*Mya arenaria*). For the first few years of this period, the relayed seed stocks were dug by hand. This proved economically unfeasible on a commercial basis, except in Wells in 1948-1951 where we used seed from Western Beach in Scarborough that were, for the most part, screened out of the sand by hand. The success of the management work in this town was reported by Robert L. Dow in Fisheries Circular No. 10 entitled, "An Experimental Program in Shellfish Management." However, it was apparent that it would be necessary to develop mechanical or hydraulic methods of gathering seed clams if they were to be used on an extended commercial basis. A jet dredge was developed in cooperation with the Clam Investigations of the Fish and Wildlife Service and more plantings were made from Wells to Jonesport. In all farms except Georgetown, predators drastically reduced the transplanted clam populations in a few months, or in several instances in a few weeks. Green crabs (*Carcinides maenas*) were observed to be most destructive; for example, in Southport nearly half a million clams ranging in size from 1/2 to 1 inch were devoured by the green crabs in three weeks.

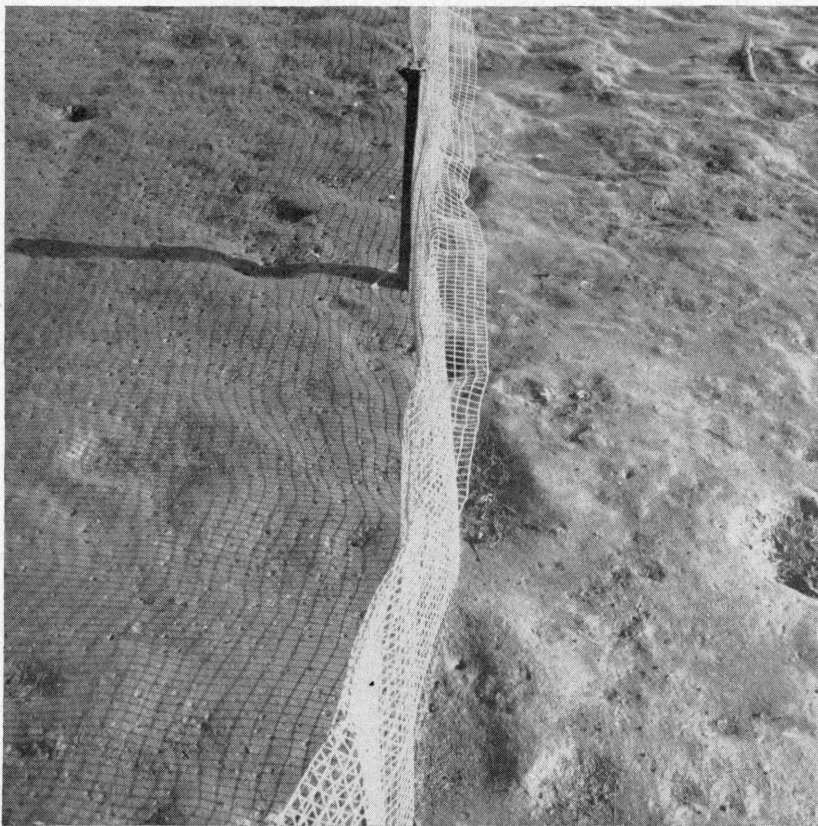
A discussion of green crabs along the Maine coast is presented in Fisheries Circular No. 8, 1952.

In the last few years experimental fencing has been carried on by our department, and in cooperation with the Federal Clam Investigations, in an effort to learn how to protect either transplanted or native clams or quahogs. One-half inch mesh, 24 inches high, hardware cloth has proved very effective in a number of small areas. The photo shown on the next page gives a good example of its effectiveness in one area. If funds and personnel are available, we hope to better evaluate the economic effectiveness of this type of protection under different hydrographic conditions. Tied in with this type of commercial scale experiments will be the collection and protection of seed clams.

Another phase of our work has been investigations into the great numbers of clams that are destroyed in the digging process. A report describing one aspect of this problem has been published by our department as Research Bulletin No. 15 entitled, "Clam (*Mya arenaria*)

Breakage in Maine," by Dow, Wallace and Taxiarchis. Average breakage under all conditions was 19.6 percent.

Experiments by the Federal Clam Investigations at Boothbay Harbor have shown that survival of clams broken in the flats is less than 1 percent. They have also carried on studies of clam mortalities, other



**A portion of a fenced clam flat. At the left, inside the fence there has been excellent survival while to the right and outside the fence where original population was nearly twice as great, practically all clams have been destroyed by green crabs**

than catch and breakage, directly resulting from hoe digging and found that approximately one-half of the unbroken clams remaining in the flats each time the flats are dug die because of depth or position. These investigations, plus work done by biologists in other states and the Fisheries Research Board of Canada, indicate that it is highly desirable to limit the frequency of digging in any area. Therefore, we

believe that the fishery should be managed by individual towns or by groups of cooperating towns in economic or biological areas to cut down this waste of clams in their flats and give the diggers, dealers and coastal communities a greater supply of food and income from their resource. We feel that our work and that of others has brought knowledge about our shellfish resources to a point where we can very profitably apply specific shellfish management practices, if we have money and personnel to extend our work with the communities and industry.

Donald Harriman has been re-assigned to shellfish work and, with headquarters at Boothbay Harbor, he covers the coast from the Piscataqua to the Penobscot River.

Malcolm Richards has been added to our staff as a full-time biologist to deal with industry problems in the eastern part of Maine. His headquarters are in Steuben.

### **Quahog Management Investigations**

Unlike soft-shell clams, small quahogs can be transplanted with a good economic profit to diggers, dealers and communities when the quahog, *Venus mercenaria*, seed is found in heavy concentrations and where the growth is greatly retarded in relation to adjacent commercially depleted areas.

Our Cooperative work continued with the quahog producing towns of Casco Bay. Experiments were commenced in 1951 to develop a self-powered hydraulic suction dredge to efficiently relay quahog seed. The *Venus M.* is shown on the following page. A description of this dredge and its operation was published as Fisheries Circular No. 15 entitled, "The Seed Quahog Dredge, *Venus M.*," by Robert L. Dow and Dana E. Wallace.

This last season 4,778 bushels of seed quahogs were transplanted in West Bath and 190 bushels in Harpswell. There are known areas in Brunswick and Harpswell as well as West Bath that will need attention another year.

West Bath, Harpswell and Brunswick have active shellfish conservation committees that have worked closely with us in applying management methods. Areas in these towns have been opened and closed these last two years as a result of public hearings and cooperative surveys and management work.

Dr. Alton H. Gustafson, chairman of the Biology Department, Bowdoin College, working with us on a part-time basis has continued growth studies in Casco Bay in order to supply us with information about the best growing areas where quahogs can be transplanted. He



has likewise made population surveys to determine concentrations of seed that may need transplantings and is keeping an experimental fence across Brickyard Cove in Harpswell in repairs and trapping green crabs above and below the fence to measure the relative abundance of crabs. No final season report is yet available, but so far the



**The Venus M. in operation**

trapable crabs outside the fence appear to be approximately five times as numerous as those inside the fence.

In an effort to learn more about the *Venus* larvae in a portion of Casco Bay, Dr. James M. Moulton of the Bowdoin College Biology Department was engaged during the Summer of 1953. His report was published as Research Bulletin No. 17 entitled, "The Distribution of *Venus* larvae in Orr's Cove Plankton over the Tide Cycle and during the Summer and early Fall of 1953."

Our many small and commercial scale experiments with the management of our quahogs have been so consistently successful that under present conditions there appears to be only two primary problems: (1) that of having sufficient money to operate the *Venus M.* and carry on our cooperative work with the towns of Casco Bay and (2) to protect small quahogs less than an inch from crab predation.



## THE ANADROMOUS FISHERY PROGRAM

By FREDERICK T. BAIRD, JR.

A full-time investigative program of our anadromous fish resources was instituted in the spring of 1954. This program is an outgrowth of part-time research programs on such species as smelts, alewives and salmon, which the Department has either carried on alone or has worked on in cooperation with such organizations as the Fish and Wildlife Service or the Sea Run Salmon Commission. Information gained from these previous investigations indicated that our coastal rivers and streams were capable of supporting, with certain improvements, either considerably larger runs or runs which had ceased to exist because of obstacles or barriers no longer of use or value.

Although this program will primarily deal with alewives and smelts it will, because of its nature, align itself with the salmon program and possibly to some work on shad. As it is currently being carried on it calls for the extensive and intensive survey of each coastal watershed which includes, area of stream and lake, water flow and temperatures, species present, history of area, obstacles, etc. From this regional survey and such other information as we have at hand, we can tell within reason the potential yield of this area for such species as alewives. If the potential of an area appears large enough to amortize within a reasonable period the cost of improvements in the form of obstacle removal or fishway construction a management program is then presented to the town or area in question for their use. During the current year three of these programs have been started from information furnished and two others are being considered.

The smelt program which has been carried on seasonally has been curtailed and a full report is being assembled. Indications are that there is some need for basic changes in legislation regulating the taking of smelts and likewise that some commercial smelting operations may well be allowed in the spring.

It is well to state here that these programs are closely co-ordinated with the Sea Run Salmon Commission's Atlantic Salmon Program and the Department of Inland Fishery and Game's fishery programs. No program is set up until these agencies have been informed and their plans for the same area examined. Likewise all information of each group is available to the others so that survey time is minimized and duplication of effort prevented. Thus all management programs are

based on the entire watershed and a group of species rather than any single part or species.

A second important phase of recent activities has been the investigative activities both hydrographic and biological which have been inaugurated on the Sheepscot River and estuary. The anadromous program is closely aligned with this and the information gained should greatly increase our knowledge of certain species and the effects on the species of changes in conditions either in the headwaters or the estuary. This program, a joint endeavor of the Department and the Fish and Wildlife Service, should in time furnish much desired information for application to and improvement of other areas.

## LOBSTERS

*By* PHILLIP L. GOGGINS

The Sea and Shore Fisheries biologists at Boothbay Harbor have continued to work closely with the lobster industry. We have been particularly concerned with improving methods of holding lobsters until marketable. We have designed a refrigerated recirculated sea water tank for displaying and holding lobsters. This tank has been used successfully both with natural and artificial sea water.

There has been a great deal of interest in recirculating systems and many times we have been called up to give advice in the design of such systems.

One problem which we look upon with the greatest concern is the increase of the incidence of an epidemic disease of lobsters, "redtail" disease of lobsters during the past year. In the past this disease has been the cause of heavy shrinkage in the commercial lobster population.

Since the end of the last epidemic the disease has been localized in a few pounds. However, during the past summer and fall the disease has spread to lobster pounds and tank systems from Portland to Jonesport. While this disease has not reached serious epidemic proportion this year, the prospects for the immediate future are not bright if this disease trend continues.

The "redtail" disease of lobster appears to be aggravated by poor holding condition (high temperature, crowding, etc.). Although we do not as yet have a clear cut approach for combating "redtail" disease, we plan to experiment with the possibility of a chemical or antibiotic treatment for diseased lobsters this winter. The possibility of chemical sterilization of lobster pound waters will also be investigated. The chemical or antibiotic treatment of lobsters at this point will not be the answer to the "redtail" problem but may lessen the mortalities during an epidemic.

Another problem which is important to the lobster industry is the development of an inexpensive substitute bait. We experimented with several baits and so far the results are hopeful but as yet inconclusive.

## OIL POLLUTION STUDIES

By JOHN HURST, JR.

Gross oil pollution is regarded throughout the world as detrimental to life, fishing gear, navigation and its potential fire hazards. National laws and international agreements have been made in regard to oil pollution.

Minor oil pollution is regarded by many as unimportant, due to the expected dispersion of the oil over large areas. The work the Department of Sea and Shore Fisheries has done (chiefly in the intertidal zone) on oil pollution indicates that minor oil pollution must also be regarded as serious.

In the laboratory it was demonstrated that quahogs (*Venus mercenaria*) and lobsters readily acquire an oily flavor when they are exposed to an oil slick. In four localities on the coast of Maine, clams (*Mya arenaria*) exposed to minor oil pollution (in the form of spills) were found to have an oily flavor. In one instance in a good clam area the oil flavor persisted for nearly four weeks. There have been several instances reported to the Department where lobsters held in cars near wharves have developed an oily flavor from bilge pumpings. In addition many oil spills make beaches and the surrounding bathing areas unattractive. The laboratory at Boothbay Harbor has conducted chemical tests from these four areas for oil and is equipped to continue these studies.

These examples illustrate the economic seriousness of minor oil pollution.

In addition to the immediate economic seriousness of minor oil pollution we have demonstrated in the laboratory that lobster fry and herring are very sensitive to oil pollution. Thus, the long range effects of oil pollution may be more serious than the immediate economic effects.



## LABORATORY FACILITIES

*By* PHILLIP L. GOGGINS

The laboratory of the Fisheries Research Station has been improved to a point where we feel that it is one of the best equipped of its kind on the east coast.

The improvements during the past two years include the rewiring of the laboratory area, the purchase of a steam pressure sterilizer for



**Laboratory research activities of the Department  
are carried on at this station**

the bacteriology laboratory, and the installation of a hood and blower in the chemistry room where oil pollution tests are conducted.

### **Pollution Survey of Closed Clam Flats**

During the past two years we have conducted bacterial surveys in 14 closed areas. They are as follows: Ogunquit, Wells, Cape Porpoise, Biddeford Pool, Spurwink River, Nonesuch River, Kennebec River, Boothbay Harbor, St. George River, Belfast, Searsport, Penobscot River, Bar Harbor and Eastport. Parts of some of these areas were

opened on a seasonal basis. Two of importance, the Kennebec River and Biddeford Pool, after careful bacterial and hydrographical surveys, were determined to be safe and were opened for short periods.

### **Clam Cleansing**

The emphasis of the clam pollution work was placed on the cleansing of polluted clams.

Clams will cleanse themselves of sewage pollution if they are held in bacterially clean sea water for twenty-four to seventy-two hours. The sea water from the pumping system at Boothbay is relatively free from fecal pollution. Several cleansing experiments, using Boothbay Harbor sea water, were conducted at the Experiment Station. The first experiments started during the summer of 1953 gave inconsistent results probably due to the fluctuating pollution load of the sea water. Subsequent experiments with clean sea water conducted during the fall and winter months gave more consistent results. Parallel experiments using sea water which was purified by chlorination and then dechlorination (chlorine interferes with the clam siphoning process) gave comparable results.

It was concluded that if the sea water was consistently clean, the clams cleansed themselves of the greatest part of the pollution in the first twenty-four hours but generally the reduction of pollution was not below the U. S. Public Health Service minimum standards. Therefore, a safe cycle of ninety hours was decided upon (seventy-two in the cleansing water was considered adequate, however, a minimum of 18 hours is required for the results of pollution tests before clams can be released).

The results of the Department of Sea and Shore Fisheries cleansing experiment and those of other organizations which experimented with shellfish cleansing were presented to the clam industry along with a cost analysis of the cleansing operation.

It was suggested that the Canadian method of cleansing clams in floats anchored at natural cleansing sites would be most practical. The cleansing of clams is commercially feasible provided that there are enough clams in a polluted area (for example enough for 10 barrels per day for sixty days) and clean water can be found in the immediate vicinity. Surveys of the amount of clams in closed areas are now in process.

Since the start of the pollution survey program in 1949, the Department has conducted the bacterial pollution work under strict adherence.

to Recommended Method of the U. S. Public Health Service. During this period we have felt that the Public Health Standards could be improved as far as the clam is concerned. Based upon our field observations and laboratory tests we have prepared a list of recommended changes in Public Standards and presented them to the U. S. Public Health Service. The U. S. Public Health Service received these recommendations favorably.